Guide for Selecting Conservation Practices

The following nine tables identify conservation practices that affect ground and surface water concerns for cropland, pastureland, hayland, forestland, and farmsteads. The tables provide guidance to planners in field offices where water resource concerns must be considered during planning. Practices are displayed in two categories: (1) those that should favorably affect water resources, and (2) those that may unfavorably affect water resources. The affects on water resources is based upon the assumption that these practices are installed according to NRCS standards.

TABLE

1. Cropland: Ground Water Concerns - QUALITY
2. Cropland: Ground Water Concerns - QUALITY
3. Cropland: Surface Water Concerns - QUALITY
4. Pastureland and Hayland: Ground Water Concerns - QUALITY
5. Pastureland and Hayland: Surface Water Concerns - QUALITY
6. Forest land: Ground Water Concerns - QUALITY
7. Forest land: Surface Water Concerns - QUALITY
8. Farmstead areas: Ground Water Concerns - QUALITY
9. Farmstead areas: Surface Water Concerns - QUALITY

These tables can be used as references when Resource Management Systems are developed or selected for any of the five land uses. These tables should be the first level of screening for the selection of practices for more detailed consideration. More detailed consideration should be given to local resource factors during the selection process, and utilizing models based on the pollution delivery process (availability, detachment, and transport). This process is affected by the water budget, the chemical budget, and entrapment of the pollutant. Water is the driving force in the pollutant delivery process,

and its presence or absence is a key consideration in determining conservation practice effects. In addition, the amount, type, and timing of chemical applications greatly influence their pollution potential and the effects of conservation practices.

Pollution from agricultural chemicals is a water quality concern associated with all land uses. The storage, handling, and disposal of agricultural chemicals pose a special hazard. Producers should be referred to label recommendations, and state guidelines for proper handling, application, and disposal.

TABLE 1
CROPLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Nutrients - Nitrogen			
Leaching of nitrogen below the root zone. Water percolating below the root zone.	Nitrogen in excess of plant needs in the root zone.	Waste Utilization Nutrient Management Waste Storage Facility Heavy Use Area Protection Conservation Cropping System Cover and Green Manure Crop Subsurface Drain Surface Drainage, Field Ditch Diversion Pasture and Hayland Planting	Conservation Tillage Contour Farming Stripcropping Terraces Water and Sediment Control Basins
Pesticides			
Leaching of pesticides below the root zone. Water percolating below the root zone.	Excess pesticide applied. Leachable pesticides. Persistent pesticides. Improper pesticide application or timing.	Conservation Cropping System Cover and Green Manure Crop Pasture and Hayland Planting Surface/Subsurface Drainage Pest Management Open Channel	Conservation Tillage System Contour Farming Stripcropping Terraces Water and Sediment Control Basins

TABLE 1 (CONTINUED)
CROPLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
		Organic Matter and Bacteria	
Enters aquifer through fractures, sinkholes, and solution channels	Over-application of waste. Application on unsuitable sites.	Waste Storage Facility Conservation Cropping System Filter Strip Heavy Use Area Protection Cover and Green Manure Crop Crop Residue Use Waste Utilization	

TABLE 2
CROPLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Inadequate water in root zone to meet plant needs	Plow pans limits root zone or downward movement of water. Bare or compacted soil surface decreases infiltration.	Terraces Conservation tillage Chiseling and subsoiling Water and sediment control basin Mulching Crop Residue Use Contour Farming Stripcropping	Conservation cropping sequence Cover and green crop
Lack of Water Available to Aquifer			
Decreased Infiltration Excess drainage	Plow pans limit downward movement of water. Bare or compacted surface soil will increase runoff.	Terraces Conservation tillage Chiseling and subsoiling Water and sediment control basin Mulching Crop Residue Use Contour Farming Stripcropping Pond Row Arrangement	Subsurface drain Surface drainage Diversion Underground outlet

TABLE 2 (CONTINUED)
CROPLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Excess Water in Root Zone			
Increased water infiltration. Poor drainage	Inadequate surface or subsurface drainage	Cover and green manure crops Conservation cropping system Precision land forming Subsurface drain Surface drainage Grassed waterways Diversions Land smoothing Underground outlet	Terraces Conservation tillage Chiseling and subsoiling Mulching Crop residue use Stripcropping

TABLE 3
CROPLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Runoff of soluble nitrogen in water. Movement of nitrogen combined with soil and organic matter from site in water.	Excess surface-applied nitrogen (all sources). Runoff water and interflow Erosion of soil and organic waste.	Nutrient management Waste utilization Structure for water control Filter strips Field border Cover and green manure crops Contour farming Chiseling and subsoiling Conservation cropping system Conservation tillage Crop Residue Use Grade stabilization structure Sediment basin Stripcropping Terrace Row Arrangement Waste storage facility Waste treatment lagoon	Brush management Precision land forming Grassed waterways Diversion Surface drainage Underground outlet
		Nutrients-Phosphorus	
Runoff of soluble phosphorus in water. movement of	Excess surface-applied phosphorus (all sources Runoff water and	Same as above	Same as above

TABLE 3 (CONTINUED)
CROPLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
phosphorus combined with organic matter from site in water.	interflow Erosion of soil and organic waste		
Pesticides			
Runoff of soluble pesticides in water. Movement of pesticides combined with soil from site in water.	Excess pesticide applied Pesticides with affinity for soil and organic matter Persistent pesticides Runoff water and interflow Improper pesticide application and/or timing	Pesticide management Erosion control practices from nutrient concerns above	Precision land forming Grassed waterway* Underground outlet

TABLE 3 (CONTINUED)
CROPLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Organic Matter and Bacteria			
Movement of organic waste, bacteria, and organic matter combined with soil from the site in water	Over application of waste Application on unsuitable sites Improper timing of waste application Storm and snow-melt runoff	Waste utilization Appropriate erosion control practices	Precision land forming Field stacking of manure
Sediment			
Soil movement in water	Precipitation runoff Unprotected soil moving into the water courses	Appropriate water erosion control practices	Brush clearing Access roads Clearing and snagging

- Chemical maintenance of vegetation may adversely effect quality of runoff water

TABLE 4
PASTURELAND OR HAYLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Nutrients - Nitrogen			
Leaching of nitrogen	Applied nitrogen in excess of plant needs in the root zone Cattle concentrating in one area for water	Nutrient management Waste utilization Pasture and hayland planting Fence Pond Watering facility Spring development Pipeline Surface drainage Subsurface drain Use exclusion Prescribed grazing system	
Pesticides			
Leaching of Pesticides	Excess pesticide applied Leachable pesticides Persistent pesticides Improper pesticide application or timing	Pest management Pasture and hayland planting Surface drainage Subsurface drain Forage harvest management	

TABLE 4 (CONTINUED)
PASTURELAND OR HAYLAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Organic Matter and Bacteria			
Enters aquifer through fractures or through macro-pores	Over application of waste Applications on unsuitable sites Concentration of livestock in fractured limestone areas	Waste utilization Fence Filter strip Watering facility Pond Water well Spring development Pipeline Prescribed grazing system Grassed waterway Water and sediment control basins Use exclusion Nutrient management Forage harvest management	

TABLE 5
PASTURELAND OR HAYLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Nutrients - Nitrogen			
Runoff of soluble nitrogen in water Movement of nitrogen combined with soil and organic matter from site	Excess surface applied nitrogen (all sources) Runoff water and interflow Erosion of soil and organic waste Cattle congregating in or near streams	Nutrient management Waste utilization Pasture and hayland planting Fencing Water well Riparian forest buffer Pond Spring development Watering facility Pipeline Use exclusion Filter strips Field borders Prescribed grazing system	Surface drainage Subsurface drain Diversion Underground outlet
Nutrients - Phosphorus			
Runoff of soluble phosphorus in water Movement of phosphorus combined with soil and organic matter from site	Surface applied phosphorus (all sources) Runoff water and interflow Erosion of soil and organic waste Cattle congregating in or near streams	Same as above	Same as above

TABLE 5 (CONTINUED)
PASTURELAND OR HAYLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Pesticides			
Runoff of soluble pesticides in water Movement of pesticides combined with soil and organic matter from site	Excess pesticide applied Pesticides with affinity for soil and organic matter Persistent pesticides Runoff water and interflow Improper pesticide application and/or timing	Pesticide management Forage harvest management Pasture and hayland planting Planned grazing system Field border Filterstrips Livestock exclusion Riparian forest buffer	Same as above
Organic Matter and Bacteria			
Movement of organic waste, organic waste, bacteria and organic matter in soil and water from the site	Over application of waste Application on unsuitable sites Improper timing of waste application	Waste utilization Prescribed grazing system Fence Filter strip Forage harvest management Watering facility Pond	

TABLE 5 (CONTINUED)
PASTURELAND OR HAYLAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
	Storm and snowmelt concentration of livestock in or near watercourses	Water well Spring development Pipeline Livestock exclusion Field border	
		Sediment	
Movement of sediment from site	Concentration of cattle in or near water courses leading to bank instability Overuse of vegetation	Forage harvest management Pasture and hayland planting Prescribed grazing system Fence Critical area planting Filter strip Pond Water well Spring development Watering facility Pipeline Streambank and shoreline Protection Field border Riparian forest buffer	

TABLE 6
FOREST LAND: GROUND WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Pesticides			
Leaching of Pesticides	Excess pesticide applied Leachable pesticides Persistent pesticides Improper pesticides application and/or timing	Pest management	Woodland site preparation
Sediment			
Enters aquifer through fractures, sink holes and solution channels Most prevalent in karst topography Enters through macropores	Disturbing soil during harvesting and site preparation	Filter strip Tree planting Forestland erosion control systems	Woodland site preparation

TABLE 7
FOREST LAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Nutrients - Nitrogen			
Runoff of soluble nutrients in water Movement of nutrients combined with soil and organic matter from site	Excess nutrients applied Nutrients with affinity for soil and organic matter Persistent nutrients Runoff water and interflow Improper nutrient application or timing	Nutrient management Tree planting	Land clearing Woodland site preparation
Pesticides			
Soil movement Soluble pesticides in runoff	Precipitation runoff Disturbed soil during harvesting and site preparation	Pest management Forest land management Forest land erosion control systems Access road Use exclusion Tree planting Filter strips Sediment basin Structure for water control Forest trails and landings	Land clearing Woodland site preparation

TABLE 7 (CONTINUED)
FOREST LAND: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
		Sediment	
Soil movement with water	Disturbing soil during Harvesting and site preparation	Filter strip Tree planting Forestland erosion control systems	Woodland site preparation Access road

TABLE 8
FARMSTEAD AREAS: GROUNDWATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
Nutrients - Nitrogen			
Leaching nitrogen	Excess nitrogen from any source	Waste storage facility Nutrient management Heavy use area protection Filter strip Diversion Use exclusion Wastewater treatment strip	
Pesticides			
Leaching Pesticides	Excess application Leachable pesticide Persistent pesticide Improper pesticide Application or timing Pesticide spillage	Pest management Agrichemical handling facility	
Organic Matter and Bacteria			
Enters aquifer through	Concentrated livestock	Waste storage facility Diversion	

TABLE 8 (CONTINUED)
FARMSTEAD AREAS: GROUNDWATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT GROUNDWATER	PRACTICES THAT MAY UNFAVORABLY AFFECT GROUNDWATER
fractures, sinkholes, and solution channels. Most prevalent in karst topography Enters through macropores	operations Improper waste handling	Roof runoff management Filter strips Wastewater treatment strip Manure transfer	
		Sediment	
Enters aquifer through fractures, sinkholes, and solution channels. Most prevalent in karst topography Enters through macropores	Soil erosion	Filter strips Fence Heavy use area protection Access road Critical area planting Diversion	

TABLE 9
FARMSTEAD AREAS: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Nutrients - Nitrogen			
Runoff of soluble nitrogen in water Movement of nitrogen combined with soil and organic matter from site	Excess nitrogen from any source Erosion of soil and organic waste	Waste storage facility Nutrient management Diversion Filter strip Grade stabilization structure Mulching Sediment basin Grassed waterway Roof runoff management Wastewater treatment strip	Heavy use area protection
Nutrients - Phosphorus			
Runoff of soluble phosphorus in water Movement of phosphorus combined with soil and organic matter from site	Excess phosphorus from any source Erosion of soil and organic waste	Same as above	Same as above

TABLE 9 (CONTINUED)
FARMSTEAD AREAS: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
Pesticides			
Runoff of soluble pesticides in water Movement of pesticides combined with soil and organic matter from site	Excess application of pesticide Pesticides with affinity for soil and organic matter Persistent pesticides Storm runoff Improper pesticide application or timing	Pest management Erosion control practices listed above Agrichemical handling facility	
Organic Matter and Bacteria			
Movement of organic waste and bacteria from site	Concentrated livestock operations Improper waste handling	Waste storage facility Diversion Filter strip Grade stabilization structure Grassed waterway Roof runoff management Sediment basin Barnyard runoff treatment Manure transfer	Heavy use area protection

TABLE 9 (CONTINUED)
FARMSTEAD AREAS: SURFACE WATER CONCERNS - QUALITY

PROCESSES	CAUSES	PRACTICES THAT SHOULD FAVORABLY AFFECT SURFACE WATER	PRACTICES THAT MAY UNFAVORABLY AFFECT SURFACE WATER
		Sediment	
Soil movement	Erosion by water	Access road Diversion Filter strip Grade stabilization structure Grassed waterway Heavy use area protection Mulching Roof runoff management Sediment basins Underground outlet	